

Claims:

1. A humanized immunoglobulin having complementarity determining regions (CDRs) from a donor immunoglobulin, heavy chain variable region frameworks from a human acceptor immunoglobulin, and light chain variable region frameworks from a human acceptor immunoglobulin, wherein said humanized immunoglobulin specifically binds to an antigen of the donor immunoglobulin, wherein said donor immunoglobulin is a chicken immunoglobulin.
2. The humanized immunoglobulin according to Claim 1, wherein said humanized immunoglobulin comprises amino acids from the donor immunoglobulin framework outside the CDRs of the humanized immunoglobulin that replace the corresponding amino acids in the acceptor immunoglobulin heavy or light chain frameworks, and each of these said donor amino acids is capable of interacting with the CDRs.
3. The humanized immunoglobulin according to Claim 1, wherein an amino acid of the human acceptor immunoglobulin framework is replaced by a human immunoglobulin consensus amino acid at its position, wherein the replaced amino acid is rare for human immunoglobulin sequences at its position.
4. The humanized immunoglobulin according to Claim 1, wherein a human acceptor immunoglobulin framework residue in at least one position selected from the group consisting of H67, H78, H93, L46, L66, and L69 is replaced.
5. The humanized immunoglobulin according to Claim 4, wherein said position or positions is occupied by an amino acid in an equivalent position of the chicken donor immunoglobulin.
6. The humanized immunoglobulin according to Claim 1, wherein amino acid sequence of the acceptor immunoglobulin heavy chain variable framework is at least 60% identical to that of the donor immunoglobulin.
7. The humanized immunoglobulin according to Claim 1, wherein said humanized immunoglobulin is capable of binding to a first antigen derived from

human as well as a second antigen derived from a non-human mammal, wherein the second antigen is substantially identical to the first antigen.

5 8. The humanized immunoglobulin according to Claim 7, wherein said non-human mammal is a mouse.

9. The humanized immunoglobulin according to Claim 1, wherein said humanized immunoglobulin specifically binds to the antigen of the donor immunoglobulin with an affinity constant of at least 10^8 M^{-1} .

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10. The humanized immunoglobulin according to Claim 1, wherein said humanized immunoglobulin binds to or neutralizes both human and mouse IL-12 or L-selectin.

15 11. The humanized immunoglobulin according to Claim 10, wherein at least one position selected from the group consisting of H47, H68, H79, L44, L55, L58, L64, and L67 of the humanized immunoglobulin is occupied by an amino acid in an equivalent position of the chicken donor immunoglobulin.

20 12. The humanized immunoglobulin according to Claim 10, wherein at least one position selected from the group consisting of H78, L7, L9, L70 and L76 of the humanized immunoglobulin is occupied by a consensus amino acid in the human acceptor immunoglobulin.

25 13. The humanized immunoglobulin according to Claim 12, wherein H78 is occupied by threonine, L7 is occupied by proline, L9 is occupied by serine, L70 is occupied by threonine, and L76 is occupied by valine.

30 14. The humanized immunoglobulin according to Claim 10, wherein positions H1-H30 of the heavy chain framework of the humanized immunoglobulin have an amino acid sequence comprising at least 85% sequence identity to SEQ ID NO: 5; positions H36-H49 of the heavy chain framework have an amino acid sequence comprising at least 85% sequence identity to SEQ ID NO: 6; positions H66-H94 of the heavy chain framework have an amino acid sequence

comprising at least 85% sequence identity to SEQ ID NO: 7; and positions H103-H113 of the heavy chain framework have an amino acid sequence comprising at least 85% sequence identity to SEQ ID NO: 8; and

wherein positions L1-L22 of the light chain framework have an amino acid
5 sequence comprising at least 85% sequence identity to SEQ ID NO: 9; position L35-L49 of the light chain framework have an amino acid sequence comprising at least 85% sequence identity to SEQ ID NO: 10; positions L57-L88 of the light chain framework have an amino acid sequence comprising at least 85% sequence identity to SEQ ID NO: 11; and positions L98-L107 of the light chain framework have an amino
10 acid sequence comprising at least 85% sequence identity to SEQ ID NO: 12.

15 15. The humanized immunoglobulin according to Claim 14, wherein said humanized immunoglobulin binds to or neutralizes human and mouse IL-12, wherein said donor immunoglobulin is a chicken donor immunoglobulin having a heavy chain variable region as presented in SEQ ID NO: 2 or 48 and a light chain variable region as presented in SEQ ID NO: 4 or 47.

20 16. The humanized immunoglobulin according to Claim 14, wherein said humanized immunoglobulin binds to or neutralizes human and mouse L-selectin, wherein said donor immunoglobulin is a chicken donor immunoglobulin having a heavy chain variable region as presented in SEQ ID NO: 82 and a light chain variable region as presented in SEQ ID NO: 80.

25 17. A chicken antibody that binds to or neutralizes human and mouse IL-12 or L-selectin.

30 18. The chicken antibody according to Claim 17, comprising a heavy chain variable region as presented in SEQ ID NO: 2 or 48 and a light chain variable region as presented in SEQ ID NO: 4 or 47.

19. The chicken antibody according to Claim 17, comprising a heavy chain variable region as presented in SEQ ID NO: 82 and a light chain variable region as presented in SEQ ID NO: 80.

20. A chimeric antibody capable of binding to human and mouse IL-12, wherein said chimeric antibody comprises a variable region derived from a chicken antibody and a constant region derived from a human antibody.

- 5 21. The chimeric chicken antibody according to Claim 20, comprising:
- (a) a heavy chain variable region as presented in SEQ ID NO:2 or 48;
 - (b) a light chain variable region as presented in SEQ ID NO:4 or 47; and
 - (c) a heavy chain and a light chain constant region of a human IgG1.

- 10 22. A chimeric antibody capable of binding to human and mouse L-selectin, wherein said chimeric antibody comprises a variable region is derived from a chicken antibody and a constant region derived from a human antibody.

- 15 23. The chimeric chicken antibody according to Claim 22, comprising:
- (a) a heavy chain variable region as presented in SEQ ID NO: 82;
 - (b) a light chain variable region as presented in SEQ ID NO: 80; and
 - (c) a heavy chain and a light chain constant region of a human IgG1.

- 20 24. A polypeptide comprising SEQ ID NO: 2, SEQ ID NO: 4, SEQ ID NO: 14, SEQ ID NO: 16, SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49, SEQ ID NO: 50, SEQ ID NO: 80, SEQ ID NO:82.

- 25 25. A polynucleotide molecule comprising SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 13, SEQ ID NO: 15, SEQ ID NO: 71, SEQ ID NO: 73, SEQ ID NO: 83, or SEQ ID NO: 85.

26. An expression vector comprising the polynucleotide molecule according to Claim 25.

- 30 27. A host cell comprising the expression vector according to Claim 26.

28. A pharmaceutical composition comprising the humanized immunoglobulin according to Claim 9 and a pharmaceutical carrier.

29. A method of treating an autoimmune disease in a subject in need of such a treatment comprising administering to said subject a therapeutically effective amount of the pharmaceutical composition according to Claim 28.

5 30. A method of producing a humanized chicken immunoglobulin comprising:

(a) preparing expression vectors comprising DNA segments encoding a heavy chain variable region of the humanized chicken immunoglobulin having complementarity determining regions (CDRs) from a donor chicken immunoglobulin and heavy chain variable region frameworks from a human acceptor immunoglobulin, and/or DNA segments encoding a light chain variable region of the humanized chicken immunoglobulin having complementarity determining regions (CDRs) from the donor chicken immunoglobulin and light chain variable region and frameworks from the human acceptor immunoglobulin;

(b) transforming host cells with said vector(s); and

15 (c) culturing said transformed host cells to produce said humanized chicken immunoglobulin.

31. The method according to Claim 30, wherein said humanized chicken immunoglobulin comprises amino acids from the donor chicken immunoglobulin framework outside the CDRs of the humanized immunoglobulin that replace the corresponding amino acids in the acceptor immunoglobulin heavy or light chain frameworks, and each of these said donor amino acids is capable of interacting with the CDRs.

25 32. The method according to Claim 30, wherein the amino acid of the human acceptor immunoglobulin framework is replaced by a human immunoglobulin consensus amino acid at its position, wherein the replaced amino acid is rare for human immunoglobulin sequences at its position.

30 33. The method according to Claim 30, wherein a residue in at least one position selected from the group consisting of H67, H78, H93, L46, L66, and L69 of the human acceptor immunoglobulin framework is replaced.